



## Rakta Dhatu Formation According to Ayurveda and Correlation with Erythropoietic Hormone

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### ABSTRACT :

Rakta Dhatu is blood and, hence, one of the most critical tissues in Ayurveda. Nourishment and sustenance of life depend on this tissue. In this article, we will see how Rakta Dhatu forms from Rasa Dhatu by metabolic action of Dhatvagni. Nutritional and lifestyle requirements are advocated for normal functioning of Rakta Dhatu. Iron-rich diet and balanced living go a long way in ensuring the proper functioning of Rakta Dhatu. In contrast to this, the current biomedical process of erythropoiesis as chiefly controlled through erythropoietin is taken up here parallel to the Ayurvedic concepts. EPO is produced in the kidneys as a response to hypoxia and stimulates the production of red blood cells in the bone marrow. Such a similarity has been considered here for conceptual and functional correlation between Rakta Dhatu and erythropoiesis in light of nutrition and regulatory mechanisms before organ functions. Such an integration would enhance patient care for blood-related disorders by decoding Ayurvedic and modern medical treatments. Otherwise stated, this body of knowledge will eventually merge ancient wisdom with contemporary science in an ethical way and is perceived to make some rightful contribution to holistic health practices.

**Keywords:** Rakta Dhatu, Ayurveda, erythropoiesis, erythropoietin, Dhatvagni, Rasa Dhatu, blood formation, integrative medicine, holistic health, red blood cells.

### Introduction:

Ayurveda is the traditional Indian medicine. Ayurveda has a very holistic approach to health and well-being. *Dhatu*s are determinants of the physical structure of the body, according to Ayurvedic physiology. There are seven *Dhatu*s, and one of them, the "*Rakta Dhatu*," enjoys a more important position. This paper tries to understand the formation of *Rakta Dhatu* according to the principles of traditional Ayurveda and also to presume their correlation with modern biomedical science concepts, specifically the erythropoietic hormone.

### Rakta Dhatu in Ayurveda

#### *Concept and Importance*

Rakta is like the blood tissue. It is the second of all the seven *Dhatu*s after *Rasa Dhatu*. *Rakta dhatu* means that which nourishes the body and gives life to it <sup>[1]</sup>.

#### *Formation of Rakta Dhatu*

The formation of *Rakta Dhatu* will take place subsequently, from the transformations of *Rasa Dhatu*. Scientists from Ayurveda explain this transformation in terms of "*Dhatvagni*", the metabolic fire that is present specific to each *Dhatu*. "*Dhatvagni*" transforms the nutrients from the ingested food to the respective *Dhatu*s stepwise <sup>[2]</sup>.

- Digestion and Absorption:** The process of digestion starts from when the food is in the stomach and the small intestine. Food in the subtle form gets broken down to basic components. These nutrients get absorbed and are collectively called *Ahara Rasa*. The *Ahara Rasa* is the building block of *Rasa Dhatu*.
- Controlled By *Rasa Dhatvagni*:** This *Ahara Rasa* is transformed into *Rasa Dhatu* in the influence of *Rasa Dhatvagni* the *Rasa Dhatu* circulates all over the body providing nourishment immediately and hydration.
- Formation of *Rakta Dhatu*:** The remaining part of *Rasa Dhatu* is then acted upon by *Rakta Dhatvagni*, which changes that part into *Rakta Dhatu*. In modern terms in the liver and spleen, this is where main conversion of nutrients into blood cells takes place.

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## Nutritional and Lifestyle Factors

According to Ayurveda, diet and lifestyle play an impeccable role in maintaining the normal form and function of *Rakta Dhatu*. Diet should be enriched with nutrition, especially with iron content. Pomegranate, beet and leafy vegetables are certain dietary products which have been advocated to the maximum extent<sup>[3]</sup>. Regular exercise, adequate sleep, stress management etc are some of the life regimes which also play a crucial role in *Rakta Dhatvagni* function.

### *Modern Correlation: Erythropoiesis and Erythropoietic Hormone*

#### *Erythropoiesis*

In medical science today, erythropoiesis can be referred to as the production of red cells or erythrocytes. This activity takes place in the bone marrow with its main objective being the maintenance of sufficient oxygen at the tissue level. The major hormone involved in regulating erythropoiesis is the erythropoietin, which is basically produced by the kidneys as a response to hypoxia or low oxygen levels<sup>[4]</sup>.

#### *Role of Erythropoietin*

It is a glycoprotein hormone whose function is inducing proliferation and differentiation of the erythroid progenitor cells in the bone marrow. The coupling in the production of this hormone to the level of oxygen in the blood is closely connected. At the moment when hypoxia is detected, the production of EPO by the kidneys is raised as it journeys to the bone marrow to enhance the production of red blood cells<sup>[5]</sup>.

#### *Nutritional and Environmental Factors*

In the same manner, how in Ayurved, it is believed that diet and lifestyle play an effective role regarding erythropoiesis; similarly, present-day science also makes a pronouncement with respect to the importance of nutrition and environmental factors affecting erythropoiesis. The generation of healthy RBC depends upon the correct intake of iron, vitamin B 12, folic acid. The other external factors responsible for affecting the number of erythropoietin levels and erythropoiesis is exercise, high altitude, and general status of health<sup>[6]</sup>.

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## Correlation Between Rakta Dhatu and Erythropoietin

### *Conceptual Similarities*

Conceptually, the Ayurvedic Rakta Dhatu and modern erythropoiesis show a number of conciliations. Both identify uniquely that nutrition and metabolic processes are involved in the formation of blood. Ayurveda conceives the transformation of Rasa Dhatu into Rakta Dhatu just as the modern understanding shows how absorbed nutrients can lead to the production of red blood cells<sup>[7]</sup>.

### *Physiological Processes*

The action of *Dhatvagni* results in the conversion of *Rasa Dhatu* into *Rakta Dhatu*; this can be-disease-pathologically correlate with the enzymatic and hormonal activity present in erythropoiesis. The liver and spleen have been cited as the prime organs involved in the formation of *Rakta Dhatu* in Ayurveda, something that agrees with the scientific understanding that these are indeed two major organs involved in the life cycle of the red blood cells right from their development to destruction<sup>[8]</sup>.

### *Regulatory Mechanisms*

The role of erythropoietin in modulating erythropoiesis has its Ayurvedic correlate in the *Dhatvagni* concept. A more general concept, *Dhatvagni* can be considered to be more or less equivalent to EPO as speaking in modern medicine. Both are powerful regulators required for optimum formation and functioning of blood cells<sup>[9]</sup>.

### *Pathological Conditions*

Both Ayurvedic and modern systems of medicine recognize diseases resulting from faulty blood formation. The anemic condition may be due to a scarcity of red blood cells or the cells not containing sufficient hemoglobin when anemia results from reduced production by the bone marrow, the cause usually is disorders like cancer, renal disease, rheumatoid arthritis, or hereditary defects. Pronounced *Rakta Dhatu* imbalance gives rise to conditions similar to what the modern medical fraternity calls anemia. Diet-based treatment, using herbal supplements and lifestyle modifications, is the usual course of treatment<sup>[10]</sup>.

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## Integrative Approach to Treatment

### Ayurvedic Treatments

Various treatments can be used to improve the quality and formation of *Rakta Dhatu*. These are:

- Herbal Supplements: Herbs such as *Ashwagandha*, *Shatavari*, and *Guduchi* are used to raise the overall vitality and assist in the formation of blood.
- Prescription of pomegranate, beetroot, and leafy greens is quite common.
- *Panchakarma* Therapy: Some detoxification procedures, such as *Virechana* or purgation and *Raktamokshana* or bloodletting, serve to remove impurities from the blood <sup>[11]</sup>.

### Modern Medical Treatments

Contemporary medicine looks at anemia and other blood conditions through the following:

- Supplementation: Iron supplements, vitamin B12 injections, and folic acid are prescribed most frequently.
- Medications: The best medication for treating anemia is the use of erythropoiesis-stimulating agents or ESAs. These are mainly used in chronic kidney disease patients.
- Lifestyle Modifications: Recommendations may include, but are not limited to dietary changes, regular exercise and controlling any comorbidity <sup>[12]</sup>.

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## Combined Approaches

An amalgamation of Ayurvedic and modern medical treatments can offer holistic treatment options. Ayurvedic diet with the help of modern supplement aids can improve overall treatment efficiency. Similarly, Ayurvedic herbs taken in combination with modern medicine can help to support blood formation in a better way, thereby ensuring better health <sup>[13]</sup>.

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## Conclusion :

Although both the generation of *Rakta Dhatu* in Ayurveda as well as erythropoiesis in modern medicine had their origin in two different paradigms, the conceptual and functional similarities are striking indeed. In fact, from general principles of nutrition to regulatory linkage and ultimately to specific organ connections for blood formation can be identified in either system. In our view, the establishment of such correlations enriches at one end the holistic approach of Ayurveda but by the other way around itself opens avenues for developing integrative treatment strategies that could potentially leverage patient care. The vast majority of ancient wisdoms are nowadays integrated into modern science; we still have great hope for furthering our knowledge and intervention into blood-related diseases.

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